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CAUSTIC RECOVERY PLANT

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RECOVERY OF CAUSTIC SODA (NaOH) IN TEXTILE INDUSTRY

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Caustic is a strongly alkaline and hygroscopic substance.

Caustic soda is a white, solid ionic chemical composed of sodium (Na^+) and hydroxide ions (OH^-).

It is also known as lye. When dissolved in water, it generates a solution with a high pH.

Chemically, caustic solutions have the ability to dissolve organic materials hydrocarbons.

It is widely employed on the market for cleaning process equipment and other purposes.

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Caustic is used in many industries in many applications.

The biggest users of caustic are the pulp, paper, and textile industry.

The Pulp, paper industry caustic is used to purify fibres, cellulosic fibres by removing dissolving all kinds of organic contaminants.

In the textile industry, similar application of removing contaminations from rayon fibres before it goes to the fabric manufacturing and mercerization

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In most cases caustic is simply going to drain to the wastewater treatment plant to be treated as part of the overall wastewater of the plant.

Caustic is an expensive chemical it's the price varies depending on manufacturing and production, but it's overall between 300 to 900$ per tonne of solid 100% caustic.

So, recovering of caustic before it goes to the drain and before it goes to the wastewater treatment plant can save a lot of money to the user.

It also saves water energy and overall, the cost saving for the recovery of caustic is to the manufacturer is very high

Mercerising machine

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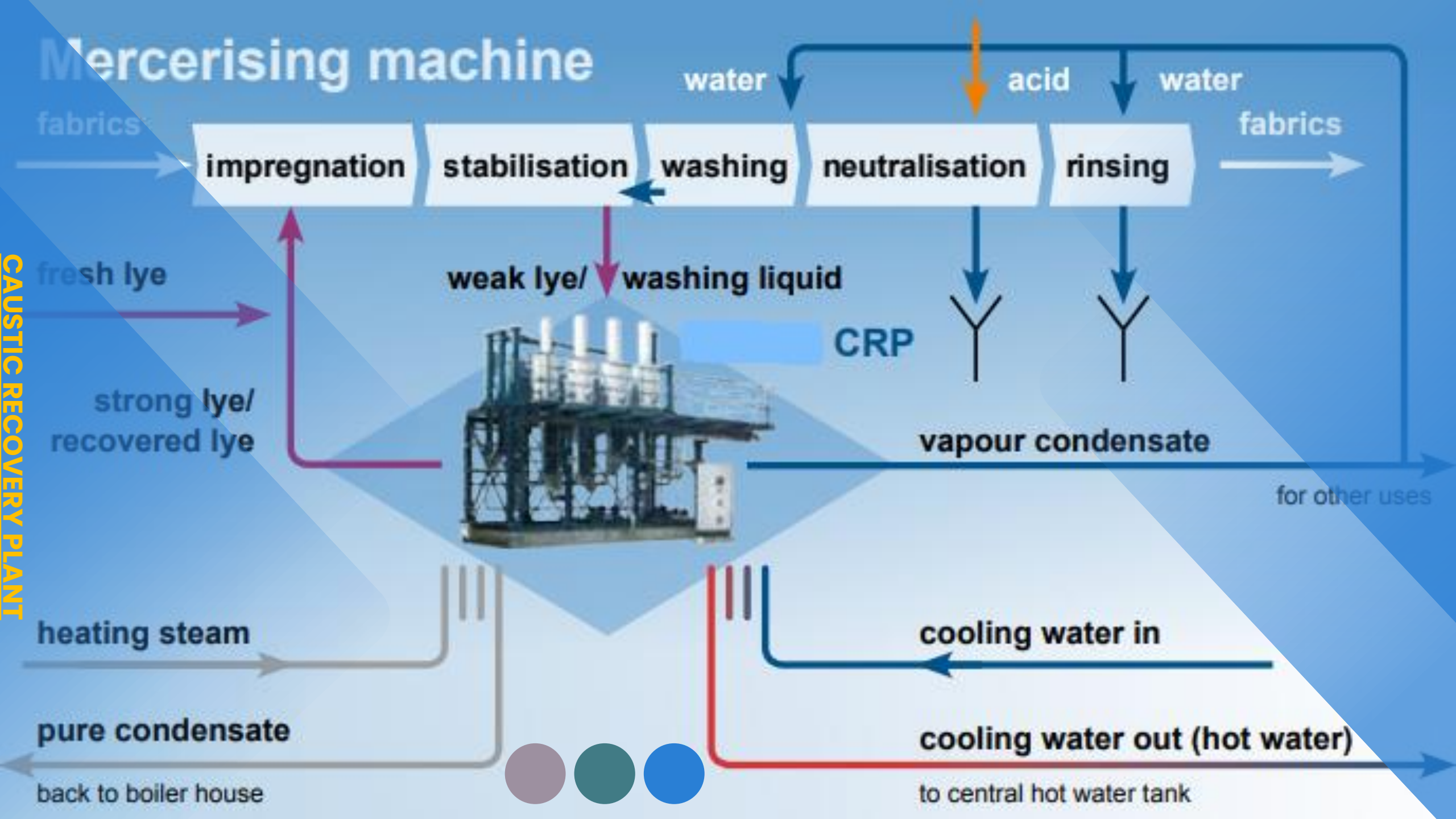

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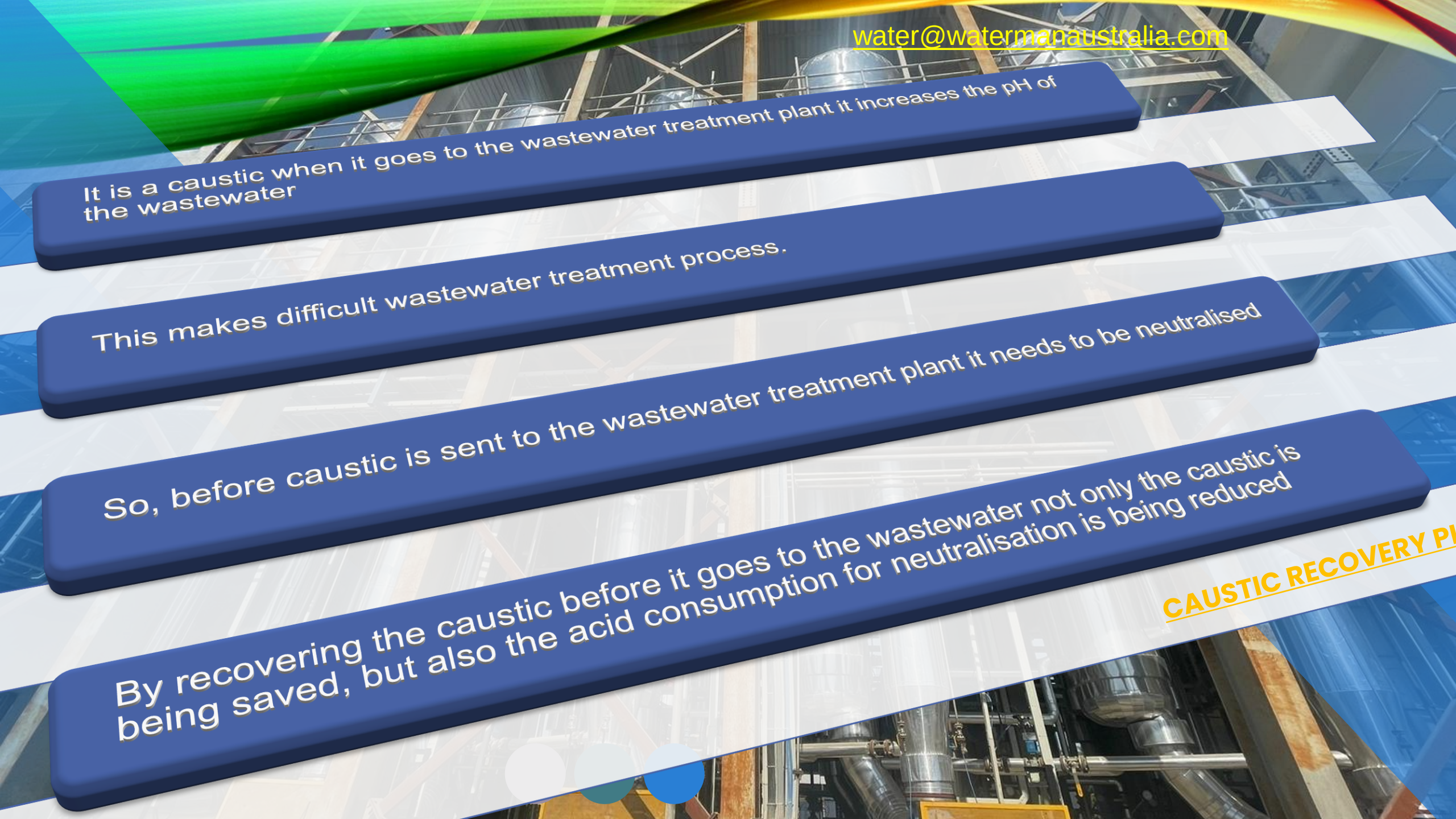
It is a caustic when it goes to the wastewater treatment plant it increases the pH of the wastewater

This makes difficult wastewater treatment process.

So, before caustic is sent to the wastewater treatment plant it needs to be neutralised

By recovering the caustic before it goes to the wastewater not only the caustic is being saved, but also the acid consumption for neutralisation is being reduced



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Smallest system typically treats around 5000 gallons per day or one cubic metre per hour.

It is based on one single pressure vessel with loaded with spiral bound elements.

Their largest system is designed to treat 250,000 gallons per day.

For larger flow rates, we can either customise the larger system or provide multiple scales of the large systems.

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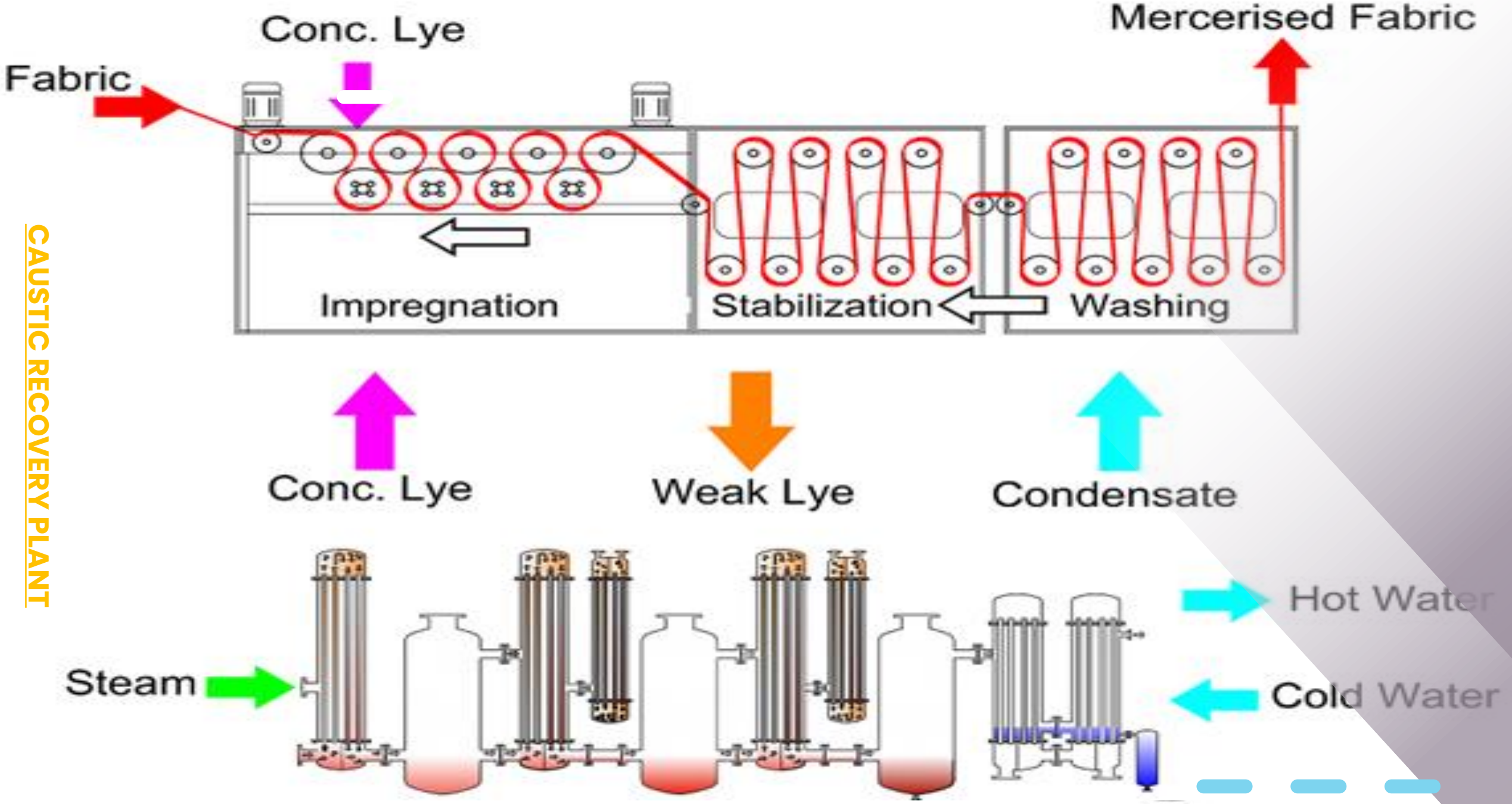

Who can install this caustic recovery system?

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- If you are user and that you purchase caustic in large quantities and you dispose caustic in large quantities to your wastewater treatment
- Or likely use acid to neutralise this caustic and you use the caustic at 1% concentration or higher, most likely you're a very good candidate for caustic recovery system.
- Overall, you will save money on purchasing less caustic and let's not forget the environmental impact of recovering caustic.
- Caustic has a lot of sodium in it and disposing sodium into the environment is not a good thing. It's a global goal to reduce disposal and use of sodium.
- So, recovering caustic is basically improvement of environmental sustainability and if we can help the environment and save money, this is a win situation.

It is Worth to Recover Caustic Soda

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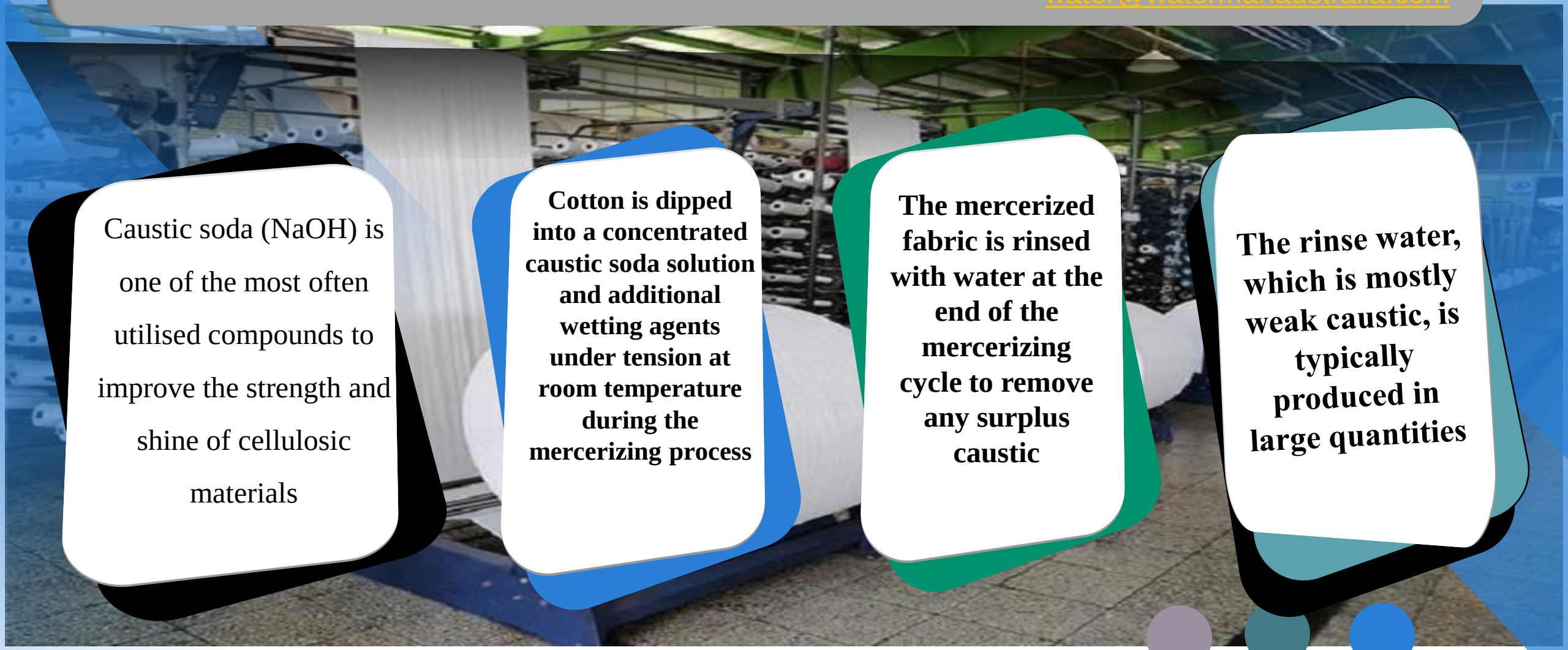

Caustic soda (NaOH) is one of the most often utilised compounds to improve the strength and shine of cellulosic materials

Cotton is dipped into a concentrated caustic soda solution and additional wetting agents under tension at room temperature during the mercerizing process

The mercerized fabric is rinsed with water at the end of the mercerizing cycle to remove any surplus caustic

The rinse water, which is mostly weak caustic, is typically produced in large quantities

NEED OF CAUSTIC RECOVERY IN TEXTILE INDUSTRY

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The textile industry uses large quantities of caustic soda in the process of scouring and mercerizing of natural fibers.

This process results in the generation of large amounts of caustic waste, which is typically disposed of as effluent.

By recovering the caustic soda from the waste stream, it can be reused in the production process

Reducing the need to purchase and use fresh caustic soda.

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This not only reduces the cost of production but also helps to reduce the environmental impact of the textile industry

By reducing the amount of waste generated and reducing the overall consumption of caustic soda.

Moreover, caustic soda recovery also helps to improve the quality of effluent discharge

As the recovered caustic soda can be neutralized, reducing the pH level of the effluent and making it safer for discharge into the environment.

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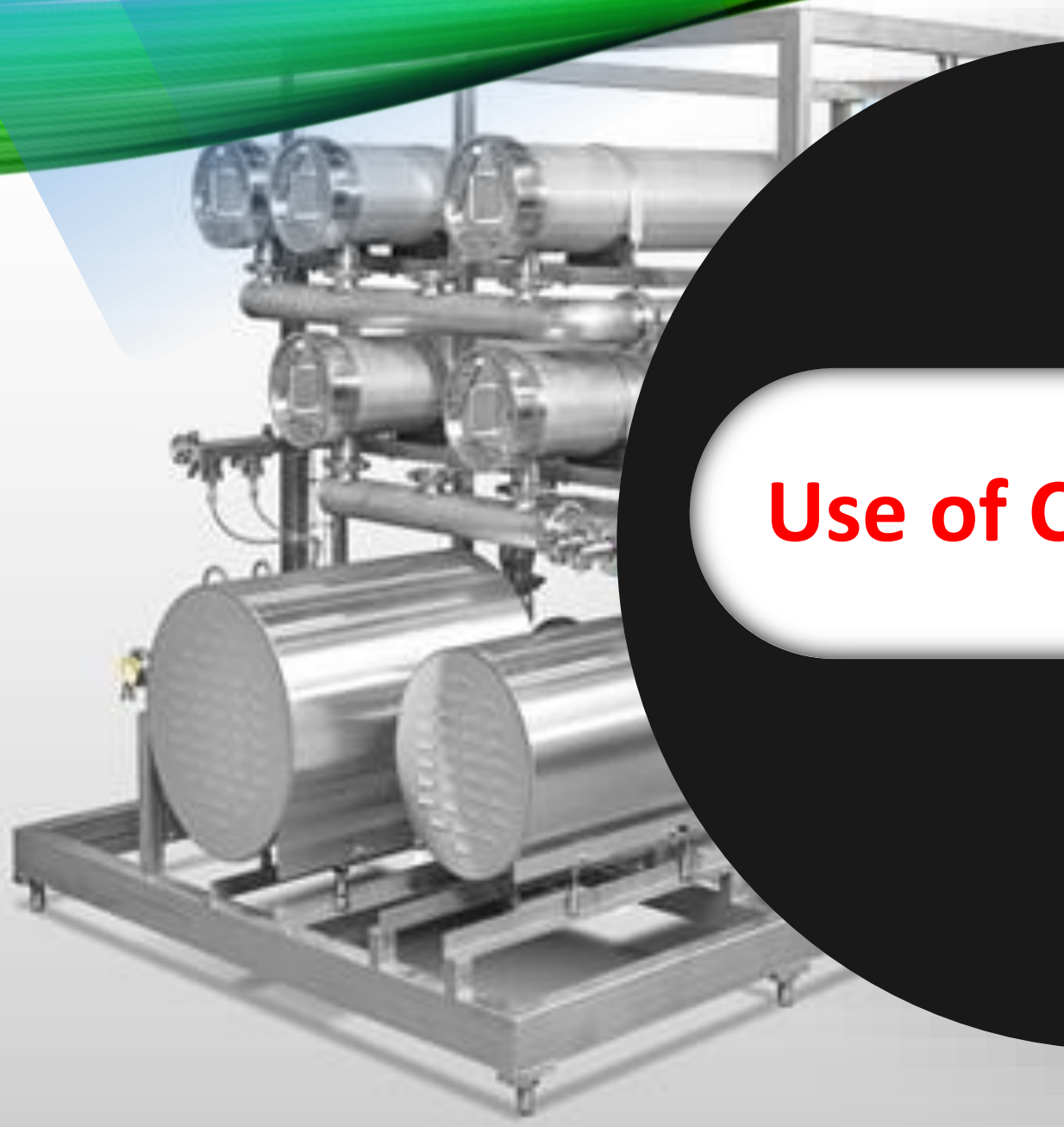

Use of Caustic in Textile Industry

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Scouring	Scouring: Caustic soda is used to remove natural impurities such as wax, grease, and pectin from raw fibers, such as cotton, before spinning.
Mercerizing	Mercerizing: This process involves immersing the cotton fibers in a caustic soda solution, which causes the fibers to swell and become more lustrous and stronger.
Bleaching	Bleaching: Caustic soda is used in the bleaching process to remove color and other impurities from textiles. This process is often followed by hydrogen peroxide to achieve a bright, white color.
Dyeing	Dyeing: Caustic soda is used as a leveling agent in the dyeing process to ensure that the dye penetrates evenly throughout the fabric.
Finishing	Finishing: Caustic soda is used in the finishing process to soften textiles and improve their hand feel.

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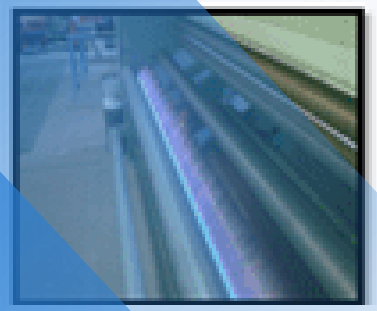
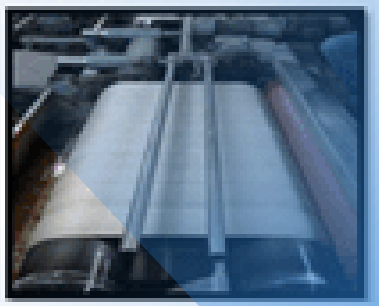
SINGEING → DESIZING → SCOURING → BLEACHING → MERCERISING








Mercerizing Process in Textile Industry
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Mercerizing is a process in the textile industry that is used to improve the appearance and strength of natural fibers, particularly cotton.

The process involves immersing the cotton fibers in a caustic soda solution, which causes the fibers to swell and become more lustrous and stronger.

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Pretreatment: The cotton fibers are cleaned and scoured to remove any impurities, such as wax, grease, and pectin.

Immersion in caustic soda solution: The cotton fibers are immersed in a concentrated caustic soda solution, typically at a concentration of 18-25% and at a temperature of around 20-30°C. The fibers are kept in the solution for a period of time, typically 15-30 minutes, depending on the desired level of mercerization.

Neutralization: After the mercerizing process, the fibers are neutralized in a dilute acid solution, such as acetic acid or citric acid, to stop the action of the caustic soda and stabilize the fibers.

Washing: The fibers are then washed to remove any residual caustic soda and acid from the fibers.

Drying: The fibers are dried, either by air-drying or machine-drying, to remove any moisture.

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DILUTED LYE PRODUCED AFTER DYE, TEXTILE PROCESSING

Diluted lye is a byproduct generated during textile processing, particularly after dyeing.

Lye, also known as sodium hydroxide is used in the dyeing process to adjust the pH level of the dye bath to ensure proper dye penetration and fixation on the fibers.

After the dyeing process, the lye solution is typically diluted with water, producing a diluted lye solution.

The diluted lye solution contains residual dye and other impurities, and it must be properly treated before being discharged into the environment.

The treatment typically involves neutralizing the lye solution with an acid, such as acetic acid, to reduce the pH level and make it safe for discharge.

In some cases, the diluted lye solution can be reused in the production process, such as for scouring or mercerizing.

This helps to reduce the amount of waste generated and the overall consumption of caustic soda.

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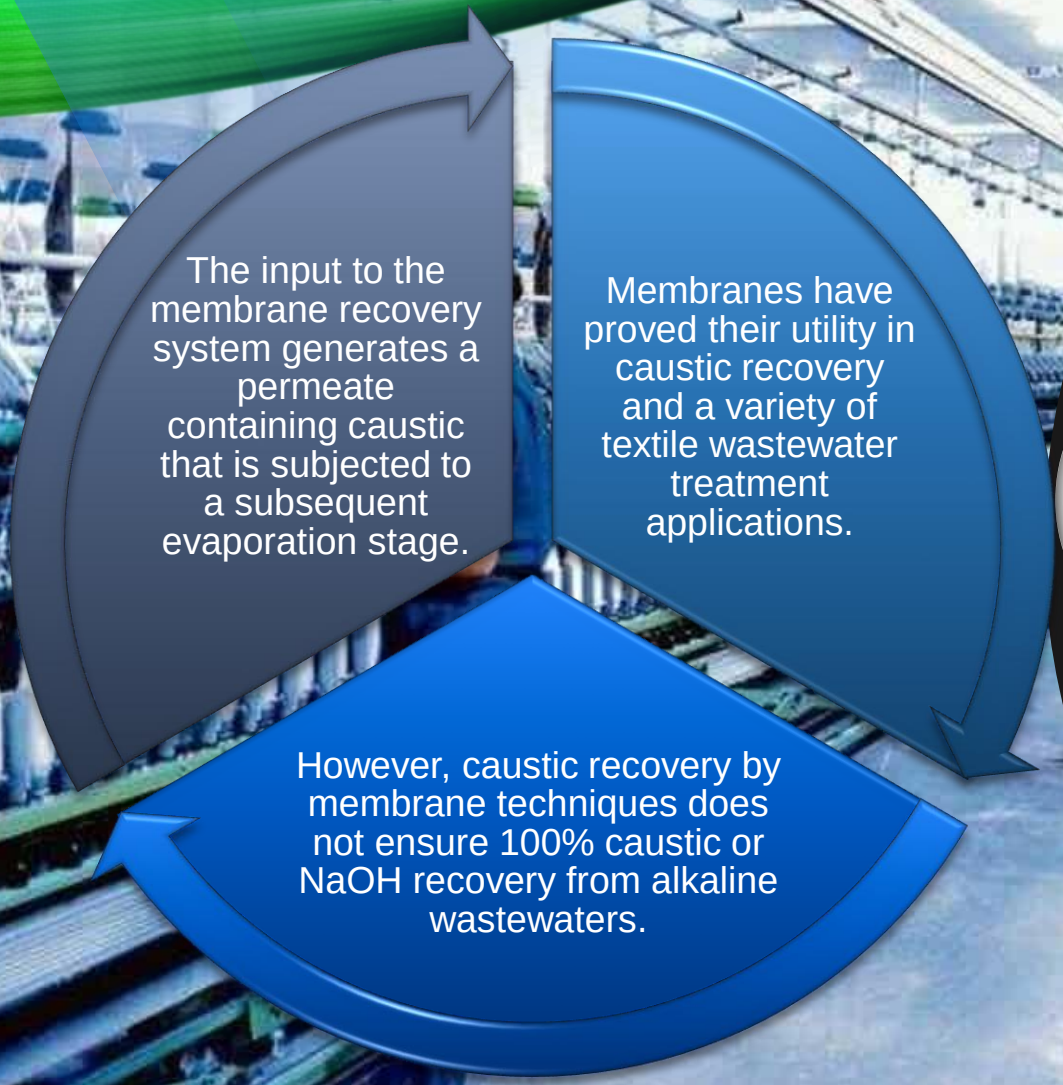

1.Membrane Based Caustic Recovery Methods

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UF is recognised by the membrane technology as a caustic recovery technique.

Although caustic has been recovered from mercerizing process effluents using this method

It is generally considered sufficient for particle and macromolecule removal; nevertheless, additional treatment is normally required for decolorization.

However, NF may be used to decolorize and separate organic molecules with low molecular weights as well as divalent ions.

Additionally, it has a unique softening effect

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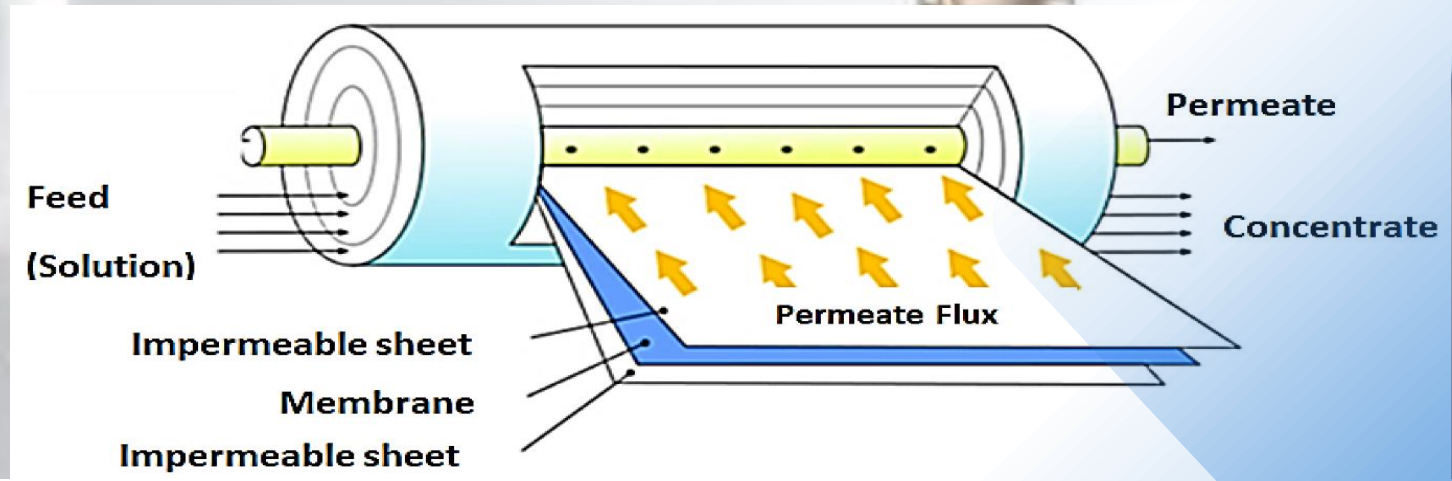

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2. Multi Effect Evaporator Based Caustic Recovery Methods

Based on evaporation from natural circulation, the CRP is formulated.

The steam from the boiling water cools and condenses on the outside of the tubes, heating the lye inside.

The heating tubes bring the lye to a boil, and the mixture of boiling lye and steam flows into the separator. The separator is set up sideways so that it can separate the steam from the circulating lye.

The next step is to heat the vapour to make steam. A partial vapour flow is used to heat up the weak caustic soda.

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In the textile industry, dilute caustic solutions are often concentrated to higher levels during the caustic recovery process.

The concentration of dilute caustic soda solutions, typically around 3%, can be increased to higher levels, such as 24%, through a process called evaporation.

During the evaporation process, the water is removed from the dilute caustic soda solution through heating, resulting in a concentrated caustic soda solution.

Dilute caustic around 3% would be concentrated up to 24 %

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The concentrated solution can then be reused in the production process, reducing the need for fresh caustic soda and minimizing waste.

It is important to note that the evaporation process requires careful control of the temperature and pressure to ensure that the caustic soda does not break down

The resulting solution meets the specifications for use in the production process.

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BENEFITS OF CAUSTIC RECOVERY SYSTEMS IN TEXTILE INDUSTRY

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Reduced costs: By recovering and reusing caustic soda, the textile industry can reduce the amount of fresh caustic soda that needs to be purchased, leading to reduced costs.

Improved sustainability: The caustic recovery process is an important part of sustainable textile production, as it helps to conserve resources and reduce waste.

Increased efficiency: By reusing the recovered caustic soda, the textile industry can increase the efficiency of its production processes, leading to improved productivity and cost savings.

Improved product quality: The recovered caustic soda can be used in the production process to improve the quality of the final product, such as through mercerization, scouring, and bleaching.

Compliance with environmental regulations: The treatment of waste streams, including the recovery and reuse of caustic soda, is an important part of compliance with environmental regulations. The use of caustic recovery systems helps to ensure that the textile industry is operating in an environmentally responsible manner.

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